Health&Safety Manual

Supplement 2.02

Preparation of Operational Safety Procedures and Facility Safety Procedures

October 1994

Approved by the ES&H Working Group

_____ date _____

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Laboratory Executive Officer

Preparation of Operational Safety Procedures and Facility Safety Procedures*

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Appendices

*New supplement

Preparation ofFacility Safety Procedures and Operational Safety Procedures

1.0 Introduction

Some operations performed in LLNL facilities require careful planning of the activities to determine the hazards involved and the necessary safety procedures. Work planning also enhances the safety of LLNL employees, the public, the environment, and property. Chapter 2 of the *Health & Safety Manual* describes the work planning process that governs LLNL activities. *Do not proceed with this supplement unless you are familiar with the contents of Chapter 2.*

The two types of safety procedures that govern work performed in LLNL facilities are operational safety procedures (OSPs), which are reviewed and revised annually; and facility safety procedures (FSPs), which are issued every three years. An OSP can be used to expand the activities covered by an FSP for one year. Safety procedures are not detailed operational manuals, work instructions, or operating procedures. These documents may be written separately and referenced in the safety procedure.

The primary purposes of an OSP or FSP are to (1) identify the individuals responsible for implementing safe operations, (2) address ES&H concerns associated with a specific activity (OSP) or all activities (FSP), and (3) describe how such activities will be controlled to comply with the Laboratory's environmental, safety, and health (ES&H) policies and objectives.

It is not possible to list the many activities performed in LLNL facilities that may require an OSP or FSP. Some activities require the best judgment of the managers responsible for the operation. This supplement only provides a general list of activities that may require an OSP and FSP. It also describes how these procedures shall be written, reviewed, approved, distributed, extended, and changed. The ES&H analysis process is described in Chapter 2 and Supplement 6.06 of the *Health & Safety Manual*.

2.0 Requirements/Regulatory Summary

The guidelines and controls in this supplement are governed by LLNL's ES&H policies and by various Department of Energy (DOE) directives that have been accepted by the University of California and incorporated into Appendix G of Contract 48.

3.0 Applicability

This supplement is applicable to all LLNL activities that require an OSP or FSP and to anyone who prepares these procedures. The following documents do not have to be changed to conform with the requirements of this supplement: (1) existing, approved ES&H documents; and (2) OSPs and FSPs that are being written and/or reviewed, provided that they are completely reviewed and approved in less than 60 days after the approval date of this supplement.

4.0 Safety Procedures

4.1 Activities Requiring Safety Procedures

A safety procedure is required in one or more of the following instances:

1. When an activity will deviate from the control requirements specified in an LLNL-accepted DOE standard, the *Health & Safety Manual*, or the *Environmental Compliance Manual* (hereafter referred to as "ES&H Documents").
2. When management requires that documentation be prepared to describe the ES&H controls incorporated into an activity.
3. When the Hazards Control Department and Responsible Individual jointly determine that an evaluation is required for a proposed activity.
4. When specifically required by the ES&H documents.

Appendix A lists some examples of specific activities that require a safety procedure. It also gives examples of activities that are adequately covered by the ES&H documents and therefore do not require an FSP or OSP. If you are still uncertain whether a safety procedure is required for a (proposed) activity after reviewing these examples, consult your Facility Manager or the appropriate ES&H team leader.

4.2 Writing Safety Procedures

Facility safety procedures are prepared by the Facility Manager or the person designated by the Facility Associate Director (AD). OSPs are prepared by the project manager or lead experimenter.

In addition, personnel from the Engineering Department and the ES&H team assigned to the area where a proposed activity will be performed can assist with all aspects of the safety procedure process. Early involvement of the team is encouraged to help identify ES&H concerns that need to be addressed in the safety procedure, including those concerns that are already covered by existing documentation (*Health & Safety Manual*, FSPs, National Environmental Protection Act [NEPA], etc.). The ES&H team can also provide information about other activities in the area that may have an adverse impact on the proposed activity.

Prior to commencing an activity, the Responsible Individual or manager preparing the safety procedure must initiate a thorough review of existing facility- and activity-specific ES&H documents that may contain key operating instructions and impose limiting parameters. These documents may include

- An Engineering Safety Note (ESN). An ESN for experimental apparatus may contain operating and maintenance requirements that are critical for safe use. If an ESN has been prepared (e.g., for high-pressure apparatus), include a summary of the design parameters that establish the system's limitations. Be sure to list the

ESN in the reference section and submit a copy of it when the OSP is submitted for review. Keep a copy of the ESN in the work area.

- Maintenance Plans. Refer to existing maintenance plans and programs for critical items and systems. Specific maintenance manuals are prepared for some facilities.

After reviewing the proposed activity with the ES&H team, the Responsible Individual prepares a draft procedure documenting the results of the planning process. For guidance on the format and content of this procedure, see Appendices C and D. If any part of the activity will conflict with DOE-accepted standards or other mandatory regulations, then obtain a variance before the activity begins (see Chapter 1 of the *Health & Safety Manual*). Information describing the approved variance and the measures that provide equivalent protection must be included in the procedure. The Responsible Individual must also ensure that the procedure is approved before initial operation of a new activity. Sufficient time (usually one month for an OSP, and up to three months for an FSP) must be allowed to review, approve, and process the draft procedure.

Safety-related information must be included in the required reading list when at least one aspect of an activity requires a safety procedure.

4.3 Reviewing Safety Procedures

Operations are to be revaluated by appropriately qualified individuals to ensure that hazards are properly identified and that mitigation measures are effective. The responsible individual shall ensure that the collective knowledge of the reviewers cover the entire scope of the operation.

The review process for a safety procedure requires the ES&H team leader to ensure that the draft procedure is reviewed by the appropriate ES&H discipline members and the Health Services Department. The ES&H team shall do the following:

- Number the procedure.
- Route a copy of the draft to individuals designated by the program to review the document, and to those listed in Appendix E.
- Coordinate reviews and approvals.
- Publish the finished procedure.
- Retain the original copy of the final procedure that includes signatures and reviewers' comments, except when the document is classified. Classified procedures are returned to the originating organization. All FSPs and OSPs are to be retained for 75 years.

Anyone responsible for reviewing safety procedures shall do the following:

- Be satisfied that all appropriate hazards have been identified, and that the controls selected (including the design of controls) will be effective and practical in meeting the Laboratory's ES&H policies and objectives.
- Contact the individual responsible for the safety procedure if additional information or clarification is required.

- Make suggested changes or additions on the review copy and initial those changes.
- Initial the Pre-publication Review Form (LL-4337) to indicate that you have read the procedure and agreed with its contents.

During the review process, the Facility Manager (or the individual designated by the Facility AD) shall ensure that the safety procedure complies with technical safety requirements (TSRs, for nuclear facilities only), operational safety requirements (OSRs), or other safety limits and limiting conditions of operations specified in any relevant safety analysis document; and environmental permit limits or requirements.

4.4 Approving Safety Procedures

The manager who approves the safety procedure must ensure that a thorough review of the procedure and related relevant documentation is performed by his/her subordinate line management, that an independent review is performed by the ES&H team, and that reviewers of the procedure are satisfied with the effectiveness of the controls specified. An approval signature on the completed procedure indicates that the activity complies with the Laboratory's ES&H policies and that line management accepts the residual risk.

Managers may delegate approval authority for safety procedures to another individual. Such individuals must be authorized in writing for the level of procedure they may approve. For example, an FSP may authorize the Facility Manager to approve subsequent changes to the FSP and supplemental OSP changes. Managers always retain their original ES&H responsibilities.

An FSP shall be approved by the Facility AD (or his/her designee); an OSP shall be approved by the appropriate management level of the program performing the activity (see Appendix E). The Facility Manager (or his/her designee) shall concur with all operations conducted in his/her facility. All Site 300 FSPs and OSPs require the signed concurrence of the Site 300 Manager.

Conflict of Interest. Any person serving as a Responsible Individual for an activity requiring a safety procedure or analysis shall NOT have approval authority governing the conduct of that activity.

4.5 Controlling and Disseminating Safety Procedures

All work that requires a safety procedure shall be conducted in accordance with the current version of that procedure. This will be accomplished using the following process of document control:

- The individual responsible for the safety procedure and the ES&H team shall develop an official distribution list of individuals who need or requested an official copy of the procedure.

- Unless other arrangements have been made, the ES&H team shall
  - — distribute safety procedures, changes to procedures, and extension notices to individuals on the official distribution list;
  - — maintain a list of all current safety procedures and a record of changes (Individuals on this list are responsible for submitting changes for incorporation into the original safety procedure.);
  - — maintain an official copy of all safety procedures for 75 years.
- Official copies of safety procedures shall be stamped "OFFICIAL COPY" on the cover (or front page) in red ink so that they can be easily identified.
- Every page of the safety procedure shall have the date or revision number, or the effective change of the original issue. All changes and / or extensions to a safety procedure shall be filed with each official copy.
- The Responsible Individual shall ensure that official copies of the procedure being used in the workplace and / or used to control the activity
  - — are current or have a valid extension attached;
  - — have all approved changes attached.

An official copy of an FSP shall be available to all facility residents, and an official copy of applicable OSPs shall be available in each work area. *Unofficial copies shall not be used to control an activity.*

Before personnel begin work on an activity controlled by a safety procedure, and periodically after that, or when a change is incorporated into the procedure, the Responsible Individual shall verify and document that those involve in the activity have read and and agreed to comply with the safety procedure (see Appendix F for a sample form, which may be used to document these actions).

4.6 Extending and Reviewing Safety Procedures

New and revised FSPs shall authorize operations for a maximum of three years. Similarly, new and revised OSPs shall authorize operations for a maximum of one year. When a safety procedure expires, the activity must be terminated unless an extension has been approved or the procedure has been revised and reissued.

With concurrence of the Facility Manager and the ES&H team leader, the manager who approved the OSP may provide a one-time extension of up to three months. The Facility AD and the ES&H team leader may authorize a one-time extension of up to six months for an FSP. Additional extensions beyond these limits must be approved by the cognizant AD and the head of the Hazards Control Department.

Safety procedures for ongoing activities must be reviewed before they expire or during the extension period. Reviewers must ensure that the content of these procedures reflects current activities and complies with new ES&H regulations. Consideration should be given to incorporating into the FSP the controls of any ongoing activity covered by an OSP. If no changes are required following the review, the procedure shall be signed by the appropriate personnel and reissued with a new expiration date.

4.7 Making Changes to Safety Procedures

Situations may arise that require limited, but prompt changes to a safety procedure before the next review date (e.g., to establish new or revised controls based on changes in regulatory requirements, experiment or activity changes, or for a new or revised safety analysis). These changes are accomplished by issuing a change to the FSP or OSP, which shall contain only the information required for documentation. Each page with a change shall have the word "change" and the number of the original procedure, followed by a consecutive number (e.g., FSP 222-1, OSP 222.15-1, etc.) below the word at the top center of each page. Other acceptable alternatives are to issue new change pages with a cover memo or reissue the entire safety procedure with the original expiration date and a change date. Any changes in operations that may increase ES&H hazards or decrease controls must be reviewed, approved, and distributed in the same manner as the original procedure. Changes in operations with no adverse ES&H implications (e.g., personnel changes) may be approved by the individual approving the original procedure (or an authorized designee) and the ES&H Team Leader. Subsequent revisions to the procedure shall include all applicable changes.

5.0 Training

Authors of safety procedures should take course HS0032, "Preparing an Operational Safety Procedure." This course is offered by the Hazards Control Department.

6.0 LLNL Contacts

Contact the ES&H team for your area or the individual responsible for the safety procedure if you have questions or need assistance.

7.0 Supporting References and Standards

Health and Safety Manual, Hazards Control Department, Lawrence Livermore National Laboratory, Livermore, CA.

Environmental Compliance Manual, Environmental Protection Department, Lawrence Livermore National Laboratory, Livermore, CA (draft).

LLNL Training Program Manual, Lawrence Livermore National Laboratory, Livermore, CA (UCRL-MA-106166).

LLNL Course Catalog, Employee development Division, Lawrence Livermore National Laboratory, Livermore, CA (current issue).

Appendix A

Specific Activities that Do or Do Not Require a Safety Procedure

There is no simple rule for determining when a safety procedure is required. The need for such procedures is determined by management's evaluation of what is required to minimize hazards to the environment, the public, and Laboratory personnel. Section 2.2.1 and the ES&H Integration Worksheet in Chapter 2 provide guidance for making this determination. The ES&H team shall assist management and the Responsible Individual with this evaluation.

A.1 Activities That Do Not Require an FSP or OSP

The following are examples of activities that do not require an OSP or FSP. These activities can be performed in accordance with all appropriate requirements and controls in the *Health & Safety Manual* and the *Environmental Compliance Manual.*

- Work with Class I sealed radiation sources (see Chapter 33 of the *Health & Safety Manual*)
- Work with Class II, III, or IV sealed radioactive sources that meet all of the requirements of that chapter (Chapter 33 of the Manual).
- Work with low-hazard unencapsulated radioactive materials that require only a Type I, II, or III workplace, as determined by the ES&H team health physicist, and that meet all the requirements of Chapter 33 of the Manual.
- Operation of a Class 1 or 2 laser that meets all the requirements of Chapter 28 of the Manual.
- Operation of cranes and forklifts that fall within the scope of Chapter 29 of the Manual.
- High-pressure systems that meet all the requirements of Chapter 32 of the Manual, have an Engineering Safety Note (ESN) updated for current operations, and do not require an OSP in accordance with Fig. 2 of Supplement 32.03. These include systems that do not exceed 1 MPa (~150 psig) or contain 75,000 ft/lb (100 kJ) of isentropic energy for gas; or systems that exceed 10 MPa (~1,500 psig) for liquids if they have a current ESN, have been tested, and are certified by an LLNL-pressure inspector as manned-area safe. Systems that contain toxic materials as specified in Section A.2 of this appendix are not included.
- Use of unmodified, commercially available equipment (e.g., smoke detectors, tritium-illuminated "EXIT" signs, anti-static devices) that incorporate radioactive materials in forms that are encapsulated or not easily dispersible.

- Work on Hazard Category 1 or 2 electrical equipment that complies with the Electronics Engineering Department's *Electrical Safety Policy*, LED 61-00-01-A1A (see Chapter 23 of the Manual).
- Operations with cryogenic materials that meet the requirements of Supplement 22.01 of the Manual.
- Use of hand tools, portable power tools, or machine tools in accordance with Chapter 26 of the Manual.
- A common industrial activity that does not require a safety procedure or environmental review.

A.2 Activities that Require an FSP

The following activities *specifically* require an FSP:

- Non-excluded hazard-ranked facilities.
- Facilities with safety systems whose maintenance is critical (e.g., emergency power for alarms and control panels) to the safe operation of the facility.
- Implementation of a chemical hygiene plan (see Supplement 21.01 of the Manual).

A.3 Activities that Require an OSP

Operational safety procedures are *specifically* required for the following systems and activities:

- New operations in a facility that are not described in the governing FSP.
- Changes to the facility infrastructure that will affect safety and / or require safety systems beyond those described in the governing FSP.

A.4 Activities Requiring an OSP or FSP

The following activities require either an OSP or FSP before work can begin:

- Operations that involve direct beam viewing of a Class 2 laser, or operation of a Class 3 or 4 laser that require an OSP in accordance with Chapter 28 of the Manual.
- Operations where controls are needed beyond those required in the *Health and Safety Manual* and the *Environmental Compliance Manual.*
- Use of fissionable material (see Chapter 31 of the *Health & Safety Manual*).
- Use of explosive materials or devices (see Chapter 24 of the Manual).
- Operations involving equipment that generates ionizing radiation.
- Operations involving open beams, such as x-ray, electron, and other energy beams

- Any Hazard Category 3 or 4 electrical equipment (see Chapter 23 of the Manual).
- Any activity requiring the bypassing of interlocks (see Supplement 11.07 of the Manual).
- Equipment that generates radio-frequency microwaves exceeding the limits described in Supplement 23.57 of the Manual.
- Operations with pressure systems that contain toxic and/or flammable liquids or gases (see Supplements 21.12 and 32.03 of the Manual), or operations that involve the use of the hazardous gases below. Note that this is only a partial list of hazardous gases.

ammonia	hydrogen cyanide monomer
arsine	hydrogen fluoride
boron trichloride	hydrogen selenide
boron trifluoride	hydrogen sulfide
1,3-butadiene	nitric oxide
carbon monoxide (>400 ppm)	nitrogen dioxide
chlorine	nitrogen trifluoride
diborane	organo-arsenic, -tin, -indium,
fluorine	-gallium
germane	phosgene
hydrogen	phosphine
hydrogen bromide	silane and derivatives
hydrogen chloride	vinyl chloride monomer

- Operations where mercury or mercury compounds will be heated.
- Research operations involving biohazards that are not addressed in Chapter 30 of the Manual.
- The processing or handling of beryllium that is likely to generate dusts, mists, fumes, or particulates (see Supplement 21.10 of the Manual).
- Operations involving liquid alkali metals or certain operations involving solid alkali metals.
- Use of some carcinogens (see Supplement 21.16 of the Manual).
- Work with machine tools in which the guarding has been removed.
- Diving activities (other than snorkeling) that are part of the work assignment.
- Any routine activity requiring access beyond a red warning light while the experiment is in progress (see Supplement 11.05 of the Manual).
- Any maintenance activities on a crane trolley platform.
- Any operation that involves the use of hazard category 4 electrical equipment (see Chapter 23 of the Manual).
- Operation of portable equipment at other than ground potential.

- Chemical handling in laboratories that do not meet the requirements of Supplement 21.01 of the Manual.
- Operation of any airborne vehicle.
- Offsite activities where LLNL has full or partial management responsibility, including existing offsite ES&H programs that have been determined to be insufficient to provide satisfactory control.
- Any activity the Hazards Control Department and the Responsible Individual determine needs a procedure based on a joint evaluation of a proposed activity.
- Any activity that does not comply with DOE or other regulatory agency ES&H requirements.
- A new activity or change to an existing activity that meets the criteria described in this appendix.

Appendix B

Guidelines for Conducting an ES&H Evaluation

This appendix is organized into five tables to help readers plan an activity from an ES&H perspective, select the appropriate controls, and determine whether a safety procedure is needed. It provides guidance for (1) systematically identifying the hazards in a facility or activity, hazardous materials, and environmental concerns; and (2) ensuring compliance with DOE-prescribed standards, other ES&H regulations, and the requirements for maintenance and quality assurance of safety systems. The hazards in a facility, along with the controls selected to address them, should be documented in either an FSP or OSP.

The tables in this appendix can also be used to help Laboratory personnel perform ES&H evaluations. However, they should only be used to the extent the reader finds them helpful. (For the benefit of users of this appendix, a copy of these tables is available through Open LabNet. If necessary, contact your ES&H team for information on how to access the tables.) Use of the tables is not a substitute for careful consideration of the ES&H aspects of an activity by the Responsible Individual. An ES&H evaluation should be a joint effort between the individual responsible for an activity and the area ES&H team. The ES&H teams include specialists in industrial hygiene, industrial safety, radiation safety (health physics), environmental protection, and other disciplines. These individuals are familiar with the ES&H requirements in Laboratory manuals and can provide guidance on the required and effective controls for the hazards and environmental concerns identified.

If these tables are employed, the Responsible Individual should print his/her name at the bottom of each table so that he/she can be contacted if there are any questions.

B.1 Instructions for Table B-1 (Energy Sources and Hazardous and/or Radioactive Materials)

1. Specify the energy sources and the hazardous and/or radioactive materials (see list on the following page) that apply to the operation. Enter this information in column 1.
2. In column 2, specify the hazardous condition(s) associated with the energy source and quantify the hazard level (e.g., high-voltage, 1000 V, and 2 A). List the quantity of hazardous and/or radioactive material to be used.
3. Place an upper boundary on the potential consequences in column 3, assuming there are no controls on the operation (e.g., toxic spill or discharge, lethal electrical shock [from a high-voltage energy source], or acid burns and eye splash [from nitric acid]). The "Potential consequences" column should also include the potential for exceeding the hazardous material limits of the Facility Safety Analysis Report and/or document.

Electrical sources
- Capacitors
- Batteries
- Static electricity
- High-current sources
- High-voltage sources

- Steam
- Flames
- Solar
- Friction
- Chemical reaction
- Spontaneous combustion

Motion sources
- Pulleys, belts, gears
- Shears, sharp edges, pinch points
- Vehicles
- Mass in motion

Gravity-mass sources
- Falling
- Falling objects
- Lifting
- Tripping, slipping
- Earthquakes

Pressure sources
- Confined gases
- Explosives
- Noise

Chemical reactions

Stressed mechanical systems

Cold sources
- Cryogenic materials

Ice, snow, wind, rain

Heat sources

Electrical

Chemical sources
- Corrosive materials
- Flammable materials
- Toxic materials
- Radioactive materials
- Carcinogenic materials
- Reactive materials
- Teratogenic materials

Radiant sources
- Infrared sources
- Intense visible light
- Lasers
- Ultraviolet (UV)
- Magnetic and electric fields
- Microwave and radio frequency
- X rays

Ionizing radiation (alpha, beta, gamma, and neutron)
- Nuclear criticality

Biological sources

Blood-borne pathogens
- Infectious diseases
- Animals

Table B-1. Energy sources and hazardous and/or radioactive materials.

1	2	3	4	5	6	7	8
Hazardous/ radioactive materials; energy sources	**Hazardous conditions**	**Potential conse quences**	**Applicable H&SM[a] Chap. and HC[b] discipline**	**Required controls**	**Required training (frequency)**	**Safety procedure required?**	**Medical surveillance**

[a] Health & Safety Manual

[b] Hazard Control Department

Responsible Individual

4. Identify the chapter and/or supplement of the *Health & Safety Manual* applicable to the energy source, or identify the appropriate discipline member from the Hazards Control Department or the Environmental Protection Department (EPD) for your area ES&H team. Enter this information in column 4.
5. Read the appropriate chapter and/or supplement of this Manual, and record in column 5 the required controls or those recommended by the discipline member from the Hazards Control Department or EPD.
6. Record the training required by the *LLNL Training Program Manual* in column 6.
7. If this Manual requires a safety procedure or if the hazards and its controls must be documented in a safety procedure, answer "Yes" in column 7. For example, if the hazardous material is beryllium, Supplement 21.10 states that a safety procedure is required if the operation involves dispersible forms (dust, fines, or powders) of beryllium.
8. Consult the ES&H team to determine if medical surveillance or personnel monitoring is required for any of the hazards listed in column 1. In column 8, answer "Yes" if medical surveillance is required.

B.2 Instructions for Table B-2 (Environmental Concerns)

1. Using the *Environmental Compliance Manual* and the list below, identify the environmental concerns associated with the activity. Enter those concerns in column 1 of Table B-2. This list contains examples of items to consider.

Air pollutants
- Emission sources
- Abatement devices
- Wipe cleaning

Water pollutants
- Sanitary sewers
- Storm sewers
- Retention tanks
- Spill control

Soil pollutants

ESI/EIM mitigation measures
- Wetlands
- Flood plains
- Cultural Resources
- Endangered species

Waste generation and minimization

Waste management
- Radioactive waste
- Hazardous Waste
- Mixed waste

Waste accumulation areas
- Satellite accumulation

2. In column 2, identify the potential material released (e.g., Freon) or waste types (radioactive, hazardous, or mixed). Quantify the amount of hazardous materials available for release (source term) in units of mass per time (e.g., 500 gal./month or 5 L/week). Explain why material or waste generation is irregular or infrequent (e.g., 3 h/day at 0.005 L/h). Hazardous constituent contamination in solid or liquid wastes and in liquid or air emissions is usually expressed in mg/kg, mg/ml, or mg/m^3.
3. State the potential environmental impact in column 3, assuming no controls on the operation (e.g., "Discharge through the sanitary sewer could exceed permit levels to the Livermore Water Reclamation Plant and could result in a hazardous or radioactive material release to the environment."). Consult the environmental analyst or your area ES&H team to assess potential impacts on the environment.

Table B-2. Environmental concerns.

1	2	3	4	5	6	7
Environmental concerns	**Materials and quality**	**Potential impact**	**LLNL guidance documents**	**Required controls**	**Training required (frequency)**	**Included in safety procedure**

Responsible Individual

4. Consult the environmental analyst for your area ES&H team for assistance in identifying the applicable LLNL guidance documents. Note these in column 4.
5. From the guidance provided by your area environmental analyst, list in column 5 the required or recommended controls to eliminate and/or reduce pollution. Similarly, list the controls to manage wastes.
6. Use the *LLNL Training Program Manual* or obtain guidance from EPD on required environmental training and repeat frequency. Enter this information in column 6.
7. In column 7, state if the concern must be documented in a safety procedure.

B.3 Instructions for Table B-3 (Codes, Standards, and Regulations)

NOTE: Activities that have an adverse environmental impact may require permits from Federal or State regulatory agencies. Because the preparation and approval process for safety and environmental documents is time consuming, the need for such documentation should be determined early in the project planning phase to avoid delays in schedule.

1. In column 1 of Table B-3, identify aspects of your operation that might require permits, approval, or reporting. Consider Local, State, and Federal requirements. For assistance with completing Table B-3, contact the Operations and Regulatory Affairs Division of EPD, your area environmental analyst, or your Assurance Manager.
2. In column 2, identify the type of permit, approval, or reporting required.
3. In column 3, identify the regulatory agency requiring the permit, approval, or report.
4. In column 4, identify the actions necessary to obtain the permit or approval, or to file a report.

Table B-3. Codes, standards, and regulations.

1	2	3	4
Hazardous material condition	**Types of permit, report, approval required**	**Agency requiring permit, approval, report**	**Actions to obtain permit, approval, report**

Responsible Individual

B.4 Instructions for Table B-4 (Maintenance of Safety Systems or Equipment)

1. In column 1 of Table B-4, identify systems and/or equipment associated with the activities that are important to safety and protection of the environment. Failure to provide for maintenance of these systems or equipment could significantly increase the risk of injury, illness, loss, or damage of programmatic equipment, or impact the environment (e.g., emergency power, radiation and fire alarm systems, fire suppression systems, evacuation alarm, and retention tanks). Additional guidance is provided in Section 4 of the *LLNL Maintenance Program Guidance Manual*.
2. In column 2, identify the individual (by job title) who is responsible for conducting the required maintenance.
3. In column 3, reference facility-specific maintenance manuals or pertinent sections of the *Plant Engineering Standards Manual*.

Table B-4. Maintenance of safety systems or equipment.

1	2	3
Safety systems or equipment	**Who is responsible**	**References**

Responsible Individual

B.5 Instructions for Table B-5 (Quality Assurance of Safety Systems and Environmental Protection Equipment)

1. In column 1 of Table B-5, identify activities, systems, and equipment whose failure could adversely impact the health and safety of workers or the public, result in loss or damage of equipment, or cause damage to the environment. Failure to provide proper quality assurance (QA) of these activities, systems, and equipment could significantly increase the risk of injury, illness, loss, or damage of programmatic equipment, or impact the environment (e.g., emergency power, radiation and fire alarm systems, fire suppression systems, evacuation alarm, and retention tanks).

2. In column 2, identify the individual (by job title) who is responsible for the QA aspects of the activity.

3. In column 3, reference facility-specific QA manuals or pertinent sections of the *Plant Engineering Standards Manual.*

Table B-5. Quality Assurance of Safety Systems and Environmental Protection Equipment.

1	2	3
Activities, systems, or equipment	**Who is responsible**	**References**

Responsible Individual

Appendix C

Preparation Guide for Facility Safety Procedures

This appendix prescribes the format and content of FSPs. To the extent possible, FSPs shall be written following the format given in the example that follows. An FSP outlines the methods for avoiding, controlling, and minimizing the environmental, safety, and health (ES&H) hazards and risks identified in safety analysis reports (SARs) and other ES&H evaluations (e.g., those given in Appendix B of this supplement and in Section 2.21 and Appendix 2-C of Chapter 2 of the *Health & Safety Manual*.) The preface shall be prepared as shown and must contain all the statements provided.

Editorial comments in this appendix are enclosed in brackets ([...]).

[Title of safety procedure]

Preface

Laboratory management requires that the controls specified in this facility safety procedure (FSP) be applied to efficiently and safely perform operations within this facility. Any operation conducted in this facility that does not conform to the requirements and provisions of the *Health & Safety Manual*, the *Environmental Compliance Manual*, and this FSP must be approved by an operational safety procedure (OSP) that specifically assesses the responsibilities, hazards, and controls necessary to conduct the operation safely.

This FSP was prepared by (signature):

_____
Facility Manager

This FSP was reviewed by (signature):

_____
Hazards Control
ES&H Team Leader

This FSP was approved by (signature):

_____
Facility AD

Contents [Example]

[NOTE: As a minimum, the major topics listed below (i.e., Introduction, Responsibilities and Authorities, etc.) shall be included in every FSP. Additional topics may be required as determined by facility management and the ES&H team. The content and level of detail within each section is provided as a guideline and is *strictly dependent* on the operation of the facility, as determined in the review and approval process.

Only the main topic headings (e.g. Introduction, Responsibilities and Authorities, etc.) in the contents are numbered the same as in the guidelines on p. 22. Other applicable subheadings should be numbered in a similar manner as shown in the example (e.g., 1.1 Purpose, 1.2 Applicability, etc.)**]**

3. **(Cont'd)**

Material Handling
Roof Access Controls
Working Alone
Egress
LLNL Laboratory / Shop / Experiment Close-Out Procedure
Control of Documents
Eating and Drinking in Laboratories and Work Areas
Fire Safety
Plumbing Cross Connections
Facility Modifications
Confined Space
Chemical Hygiene Plan
Waste Disposal Plans

4 Authorized Operations, and ES&H Hazards Analyses and Controls Integration

5. Training Requirements
   Responsibility for Training
   Training Records
   Special Training Requirements
   Required Reading

6. Maintenance, Inspection, and Quality Assurance of Safety Systems, Environmental Systems, and Equipment

7. Emergency Response Plan and Procedures
   Injury, Illness, or Uncontrolled Hazards Condition
   Evacuation Alarm
   Fire Fighting
   Hazardous Materials or Waste Releases
   Radioactive Materials and Waste Releases
   Emergency Controls
   Notification of Accidents or Incidents, including Occurrence Reporting
   Notification of Unsafe Conditions

8. References

Appendices

A. Building Floor Plans
B. List of organizations Operating in the Facility and Area Supervisors
C. Emergency callout list
D. Emergency response procedures
E. Self-Help Plan [See Chapter 3 of the *Health & Safety Manual*.]
F. Spill Contingency Plan
G. [Other]

Guidelines for Each FSP Section

1. Introduction

[Use the following paragraph:**]**

This FSP describes the safety parameters for the operations in building _____ (the facility) [or building complex _____], the responsibilities and authorities of building personnel for ensuring safe operations, and operational hazards and environmental concerns and their controls. In addition, this FSP prescribes facility-specific training requirements, emergency controls, and maintenance and quality assurance requirements for ES&H-related building systems.

[Provide a brief description of the nature of the operations and a complete list of all the facilities covered by this FSP.**]**

2. Responsibilities and Authorities

2.1 General

[Identify the safety management chain for the facility. Specify the relationship between facility management and the various programmatic and / or organizational groups (user groups) operating in the facility. State who is responsible for implementing the controls specified in this FSP and who is responsible for oversight.**]**

2.2 (Continuing)

[The following sections should clearly identify the ES&H responsibilities and authorities for the Responsible Individuals and support groups.**]**

3. General Building Policies and Controls

3.1 Technical Safety Requirements (TSRs) and Operational Safety Requirements (OSRs)

[TSRs and OSRs (from a DOE-approved safety analysis) are safety limits on the conditions of operations and administrative and / or management controls required to assure safe operation of a facility. If applicable, this section shall summarize the safety limits and limiting conditions of operations for the facility (see Supplement 2.22). If no TSRs and OSRs are applicable to this facility, this section should state that fact.**]**

3.2 (Continuing)

[This section (see "Contents") should provide general ES&H policies and controls that facility management has established for the facility (e.g., room or area access controls; roof access controls; rules for working alone and after normal working hours, eating and drinking in work areas, housekeeping, seismic anchoring of equipment; and requirements for safety evaluations of specific experiments).

Examples of access controls include

- visitor / escort requirements;
- advance notification of the Facility Manager for any new equipment, system, or operation that is brought into the area;
- a safety evaluation conducted by the area ES&H team, including a review by the environmental analyst for the area, for any new equipment, system, or operation that is brought into the area;
- a safety re-evaluation which may be required before relocating or modifying any potentially hazardous equipment, system, or operation (e.g., relocating a Class IV laser or high-voltage system to another laboratory or modifying an E-beam apparatus by installing a viewing window).**]**

4. Operations; ES&H Hazards Analyses and Control Integration

[The following format provides for listing all ES&H hazards in a single section and for integrating their controls into the same section. Existing FSP formats (with separate sections for health and safety hazards and controls, and for environmental hazards and controls), may be used indefinitely for future revisions (i.e., until the Program and the ES&H team agree that a complete rewrite is warranted).**]**

Operations authorized by this FSP, including their hazards and required controls, are listed below.

4.1 Normal Operations; Hazards and Their Controls

The hazards associated with operations and activities in the area(s) that are covered by this FSP or that are adequately addressed in the *LLNL Health & Safety Manual and/or Environmental Compliance Manual* and *LLNL Training Manual* are listed below.

[Identify the classes and locations of hazardous operations and materials (and their limits) authorized for the facility that are controlled by the *Health & Safety Manual and/or Environmental Compliance Manual.* For each operation or activity, briefly describe the associated hazards and reference the section(s) from the *Health & Safety Manual and/or Environmental Compliance Manual* that addresses the hazard. See the following example:

X-ray-emitting equipment that complies with x-ray machine safety criteria as set forth in *Health & Safety Manual*, Chapter 33. X-ray-emitting equipment is located in rooms _____ and _____ .

List any special safety controls or restrictions (e.g., location of cut-off switches, grounding hooks) specific to the operation. In addition, add the pertinent section(s) of the manuals to the required reading list (see Appendix G). List the specific training requirements for the operations and activities in Section 5, "Training Requirements."**]**

4.2 Authorized Operations; Hazards and Their Controls

The hazardous operations and their necessary controls that required the issuance of this FSP and are hereby authorized by this procedure are listed below. **[**Using the following

guidelines, identify the classes of operations and materials (including their limits), the hazards associated with those classes, and the applicable controls.**]**

Operations. [Describe only those operations and activities not adequately covered in the *Health & Safety Manual and/or* in the *Environmental Compliance Manual.* Identify the specific locations of hazardous operations / activities and equipment.**]**

Hazards. [State the potential consequence(s) of the particular operation identified above. The question to be answered in this section is "If I were to conduct operations without safety controls, what would be the potential consequences"? For example, if an electrical shock hazard exist from a 30-kV power supply, the analysis shall state whether a potential shock may have fatal, serious, or minor consequences. Similarly, the consequences from a high-pressure hazard may result in a fatality or can cause severe injury to operating personnel if the pressure system or line were to rupture. If an explosion is the potential hazard, would it be completely contained by a vessel; or could it destroy the vessel or part of the room and injure operating personnel?

If a Safety Analysis Document has been written for the facility, it should describe the hazards (including the consequences outside the facility) and specify bounding accident scenarios. This information should be supplemented by the information developed in Appendix B, Table B-l, of this Supplement and Section 2.21 and Appendix 2-C of Chapter 2 of the *Health & Safety Manual,* or other hazard analysis used to assess hazards and their potential consequences to personnel. Be specific when quantifying these items.

If monitoring of exposure levels is included in the controls, the limits (PELs, TLVs, STELs, etc.) should be discussed in this section. Where there is a difference between Federal OSHA, California OSHA, or the American Conference of Governmental Industrial Hygienist (ACGIH) exposure limits to chemicals and physical agents, the more stringent limit applies.

Contact your ES&H team for assistance in stating the potential consequences of each identified hazard.**]**

Controls. [State the controls for each of the hazards identified above. Each control should be specific and contain both action and reaction (e.g., if you say, "Survey the area upon completion of the job," state what to do if contamination is found).

When addressing the items in Table B-1 (Appendix B), state the limitations of voltage, quantity, pressure, temperature, and concentrations that are vital to the control of the hazardous materials involved. Describe the necessary controls for shipping, receiving, and storing such material and specify any protective clothing to be worn. If an Engineering Safety Note has been prepared, include a summary of the design parameters that established the system's limitations; be sure to list the safety note in the reference section.

Notify the health and safety technician if there are significant changes to the location of the material so that he / she can update the "run cards" used by the Fire Department when responding to emergency calls.

Operations with hazardous chemicals are regulated by the OSHA Health Hazard Communication Standard. Guidelines for implementing this standard and the controls necessary for the safe handling of hazardous chemicals are given in Chapter 21 and its supplements of the *Health & Safety Manual*. FSPs must provide specific controls and limits that ensure compliance with this standard, including regulatory requirements (OSHA, DOE, and the EPA). Contact your ES&H team for assistance with developing adequate controls for each identified hazard.**]**

Reference the training listed in Section 5 as one of the administrative controls for the facility.

Special Considerations. **[**Identify any operation or material that is within the scope of this FSP. Require prior review of this procedure by the Facility Manager and the ES&H team leader before the operation begins or before materials are brought into the facility. Include the reason for this requirement.**]**

5. Training Requirements

[Specify who is responsible for ensuring that employees complete facility-required training and that training records are maintained. (General ES&H courses, on-the-job training courses, and recordkeeping requirements are provided in the *LLNL Training Program Manual*, *LLNL Course Catalog*, and in Chapter 7 of the *Health & Safety Manual*). If facility-specific training and recordkeeping requirements are provided in a directorate training program plan, reference the appropriate sections of that document. Specify any facility orientation and/or training for newly assigned employees (e.g., janitors) and any special requirements for summer students, visitors, and supplemental labor.

Specify the conditions, if any, under which untrained personnel can participate in hazardous operations. State how personnel working in the facility will be informed about the FSP rules and requirements governing operations.

In the section on required reading, identify FSPs and OSPs, material safety data sheets (MSDSs), emergency plans, chapters or sections of the *Health & Safety Manual*, and other documents that specifically pertain to the operation.**]**

6. Maintenance, Inspection, and Quality Assurance of Safety Systems, Environmental Systems, and Equipment

[The FSP shall identify and establish maintenance, inspection, and quality assurance (QA) requirements for systems or equipment important to safety (hereafter referred to as safety systems) and environmental protection, or equipment not covered by existing codes and standards. Tables B-4 and B-5 in Appendix B should be used as a starting point for identifying maintenance and QA requirements. Additional guidance is given in Section 4 of the *LLNL Maintenance Program Guidance Manual.*

Specify the required preventive maintenance and who in the facility is responsible for ensuring that maintenance is performed. Because safety systems support programmatic operations, address the controls that will be used to ensure that

programmatic operations are shut down (if necessary). Maintenance requirements may be provided in an appendix to the FSP. If a facility-specific maintenance manual exists or maintenance is performed by Plant Engineering, refer to the appropriate sections in the applicable manual.

Specify the QA requirements for the safety systems (i.e., state the inspection, testing, and surveillance methods) used to ensure the quality of facility systems important to safety and environmental protection. Specify the corrective action system to be used in the facility for identifying and repairing defective components, restoring systems to operation, and tracking deficiencies in safety systems. Identify the individual in the facility responsible for the QA of safety systems. Reference applicable sections of the QA plan and procedures if they exist. Review the surveillance requirements in applicable TSRs (listed in the relevant safety analysis report or document) and ensure that these requirements are included in this section.**]**

7. Emergency Response Plan and Procedures

[Identify possible emergencies that are unique to this facility, and include in the FSP a plan to respond to these emergencies.]

8. References

[List any pertinent references (e.g., hazards analyses, safety analysis documents, and Engineering Safety Notes).**]**

Appendices

[Appendices may be included as part of the FSP to provide supplementary information. Changes to appendices may be made as needed (e.g., to update the emergency callout list) without requiring a separate authorizing signature. The examples below may be sited by reference.

A. Building floor plans
B. List of organizations operating in the facility and area supervisors
C. Emergency callout list
D. Emergency response procedures
E. Self-help plan [see Chapter 3 of the *Health & Safety Manual*.]
F. Spill contingency plan
G. Required reading list
H. Other**]**

Appendix D

Preparation Guide for Operational Safety Procedures

This appendix provides guidance for writing OSPs. An OSP assigns responsibility for safe operations, describes the work to be done, identifies the hazards and environmental concerns, and specifies the controls that must be applied to the operation. An OSP outlines the methods or steps for avoiding, controlling, and minimizing the ES&H hazards and risks identified in SARs and other ES&H evaluations, such as those in Appendix B. In addition (and as applicable), the OSP should describe maintenance and quality assurance of safety-related systems and equipment. The ES&H team and engineering personnel for your area can provide guidance on preparing and processing OSPs.

OSPs and their supplements shall follow this guide for their format and content, with modifications only as necessary or appropriate for the particular operation to be described. Editorial instructions are enclosed in brackets ([...]).

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Review level _____ [A, B, or C—see Appendix E]

[Title of the operation or experimental activity]

1. Reason for Issue

[OSPs and their supplements are generally issued for one of three reasons: (1) the LLNL *Health & Safety Manual* requires a safety procedure for the proposed operation or it is not covered by the Manual; (2) the required controls specified in the *Health & Safety Manual, Environmental Compliance Manual,* or FSP cannot be applied to the operation; or (3) the operation is not within the scope of activities authorized for the facility in which the operation will be conducted. Examples of "Reason for Issue" statements are given below:

- The *Health & Safety Manual* requires a safety procedure for operations that involve the use of fissile materials (e.g., ~1 kg of ^{235}U).
- Operations with short-pulse lasers and laser dyes will be performed. The controls necessary for safe operations are not covered in the *Health & Safety Manual*.
- The FSP limits operations to Class I and II lasers and requires an OSP for Class III or IV lasers. This operation involves the use of a Class IV laser.**]**

2. Work to be Done and Location of the Activity

[Briefly describe the work to be done (i.e., state *what* is to be done, but not *how* the work will be done).

Identify the building and room number(s) where this operation will take place. If hazardous materials are involved, identify both the work involved and the storage location. If the operation is outside a building or is located offsite, describe the general location.**]**

3. Responsibilities

[Use the following paragraphs:**]**

[Name the Responsible Individual with his / her extension**]** is responsible for the safety of this operation and for assuring that all work is performed in conformance with this OSP, the FSP, and applicable sections of the *Health & Safety Manual* and *Environmental Compliance Manual.* In the absence of **[**the Responsible Individual**]**, **[**name the alternate with his / her extension**]** shall assume these responsibilities.

[NOTE: Due to ES&H liability issues, only LLNL (UC) employees, and in special cases employees of specifically designated government-owned contract-operated (GOCO) organizations, may be "Responsible Individuals" (also called lead experimenters) or alternates. Other restrictions may apply. Contact the Laboratory Counsel's Office for more information.**]**

4. Operations; Hazards Analyses and ES&H Controls Integration

Hazards

[The following format provides for listing all ES&H hazards in a single section and for integrating the discussion of their controls into the same section. Existing OSPs formatted with separate sections for health and safety hazards and controls, and environmental hazards and controls, may be used indefinitely for future revisions (i.e., until the Program and the ES&H team agree that a complete rewrite is warranted).**]**

[The hazards analysis shall address hazardous operations or radioactive materials associated with the work to be performed. This analysis is the basis for writing this OSP.

For routine activities associated with operations covered by this OSP and that are adequately addressed by the *Health & Safety Manual and/or Environmental Compliance Manual,* describe the hazards and reference the section(s) from the manuals that addresses the hazard.

Identify the hazards associated with each aspect of the operation and state the potential consequence(s) of each hazard listed. The question to be answered in this section is "If I conducted this operation without any engineered or administrative controls, what might be the potential consequences?" Use Table B-1 in Appendix B as a starting point to identify the hazards and their potential consequences. Be as specific as possible when describing the hazards and quantifying the operating parameters. Provide or reference a list of all hazardous and/or radioactive materials, including the quantities both in use and in storage, and the storage location(s).

An example of a hazards analysis for an analytical x-ray machine might read as follows:

> **EXAMPLE:** The x-ray machine has a tungsten target and will be operated at a maximum of 30 kV and 30 mA. The primary beam produces on the order of 2000 R/min at 10 cm from the tube. The primary beam is completely contained and impinges on a secondary target of yttrium. It is estimated that the exposure rate from the open-beam, 15-kV, fluorescent x rays entering the glove box is about 20 R/min (1200 R/h). The limit for hand exposure is 50 rem/yr.; therefore, an overexposure could occur with a 2.5-min exposure of the hands.

If monitoring of exposure levels is included in the controls, the limits (PELs, TLVs, STELs, etc.) should be discussed in this section. Where a difference exists among Federal OSHA, California OSHA, or the American Conference of Governmental Industrial Hygienist (ACGIH) exposure limits to chemicals and physical agents, the more stringent limit applies.

Contact your ES&H team for assistance with stating the potential consequences of each identified hazard.**]**

Controls

[Each control should be specific and contain both action and reaction (e.g., if one of the controls for contamination is to "survey the area at the completion of the job," state what to do if contamination is found). Tables B-1 in Appendix B should be used as a starting point for specifying controls.

The following are examples of controls for the x-ray hazard previously described:

> **EXAMPLES:** The secondary x-ray beam shall be enclosed in an interlocked glove box. Interlocks shall be tested semiannually by the electronics technician supporting the operation.
>
> The health and safety technician shall perform an x-ray survey when the machine is energized for the first time and annually thereafter. If the dose rates exceed 2.5 mrem/h outside the glove box, the health physicist shall be notified.

When addressing the items in Table B-1 (Appendix B), state the limitations of the temperature, pressure, and voltage that are vital to the safe control of the operations. Specify any engineered safety controls and protective equipment that must be operating to prevent injury. If an Engineering Safety Note has been prepared (e.g., for high-pressure apparatus), include a summary of the design parameters that established the system's limitations; be sure to list the safety note in the reference section.

For hazardous and/or radioactive materials, describe the required controls for shipping, receiving, storing, and using these materials. Specify any protective equipment to be used (e.g., hoods and face shields) and protective clothing to be worn.

Notify the health and safety technician if the location of hazardous chemicals and materials should be changed so that he/she can update the "run cards" used by the Fire Department when responding to an emergency.

Contact your ES&H team for assistance with developing adequate controls for each identified hazard.

Reference the training listed in Section 5 of this appendix as one of the administrative controls for the activity.**]**

5. Training and Required Reading

[Only applicable training requirements are to be specified in the OSP. Consult the training program plan(s) for the responsible directorate(s), the *LLNL Training Program Manual*, and Chapter 7 of the *Health & Safety Manual* for job-related training requirements.**]**

[The section on required reading should include FSPs and OSPs, MSDSs, chapters or sections of the *Health & Safety Manual*, and other documents that specifically pertain to an operation.**]**

6. Maintenance, Inspections, and Quality Assurance

[Identify the safety systems associated with the operation for which failure to provide preventive maintenance could significantly increase the risk of injury, illness, loss or damage of property (including programmatic equipment), or impact on the environment. Examples include interlocks, alarms on temperature sensors, hoods and filters, or scrubbers used in chemical operations. Specify the required maintenance to ensure these protective systems continue to function as designed, and identify the person responsible for conducting the maintenance. Additional guidance is provided in Section 4 of the *LLNL Maintenance Program Guidance Manual*. Refer to existing maintenance plans and programs where they exist. (Use the information developed in Table B-4, Appendix B)**.]**

[For the components and systems identified in Section 4 of the OSP as being critical to ES&H, state the methods for ensuring the quality of these systems (i.e., the schedule of tests, surveys, and inspections that will be performed on components or systems important to safety and environmental protection). Refer to existing, relevant QA plans and procedures or to applicable sections of the FSP. (Use the information developed in Table B-5, Appendix B).**]**

7. Emergency Response Plans and Procedures

[Describe the response procedures to be implemented in the event of abnormal situations or accidents unique to this operation (e.g., spill of hazardous or radioactive material). If emergency procedures are provided in the FSP and are applicable to the operation, reference the relevant FSP section.

For hazardous operations and processes with significant adverse impacts, a “safe shutdown procedure” shall be developed and posted in appropriate locations (e.g., in control rooms for accelerators, radiation-producing machines, and explosives processing and firing facilities). Safe shutdown procedures may also be required for high-voltage equipment or chemical operations involving significant quantities of toxic or radioactive materials to mitigate serious health risks to operating personnel, other Laboratory employees, and the public. These procedures shall be accessible to emergency response personnel for all operations that may be left unattended.**]**

8. References

[List the FSP, other OSPs that affect the work location, applicable Engineering Safety Notes, standard operating procedures, etc.**]**

9. Review and Approval

[Use the following statement, if applicable:**]**

"This operation is consistent with technical safety requirements or operational safety requirements (as appropriate). It also meets the specified safety limits and limiting conditions of operations in the safety analysis for building [building number and name of facility], dated [specify issue date]."

This OSP was prepared by: [Responsible Individual]

This OSP was reviewed by: [See Appendix E.]

This OSP is approved by: [See Appendix E.]

[The list of signatures to an OSP should be limited to the Responsible Individual; the Hazards Control Team Leader; the Line Manager responsible for the activity; and, if different from the Line Manager, the Facility Manager responsible for the area where the activity will occur. Other reviewers may be noted on record sheets kept with the original documentation.**]**

Controlled distribution list

Appendices

Appendix E

Review, Approval, and Authorization Levels for Safety Procedures

This appendix can be used to determine the level of management required to authorize, review, and approve a given safety procedure. The number of reviewers may be increased as appropriate. A reviewer provides technical input to the document to insure that it is accurate and meets the technical, regulatory, and legal requirements, as appropriate. The person who concurs with the procedure is agreeing that the activity and the FSP or OSP are appropriate for his/her facility or people. The "approver" is the person authorized to approve the procedure and is responsible for the activity.

Any person serving as a Responsible Individual for an activity requiring a safety procedure or analysis shall NOT have approval authority governing the conduct of that activity.

NOTE: Changes in operations with no adverse ES&H implications (e.g., personnel changes) may be approved by the individual approving the original procedure (or an authorized designee) and the ES&H Team Leader.

E.1 FSP Review and Approval

The reviewers listed below are typical, but adjustments may be necessary in some cases. Reviewers and approvers may designate others to perform the review, but they retain responsibility for the effectiveness and timeliness of the review process.

Reviewers

- ES&H Team Leader
- Facility Manager/Supervisor
- Assurance Manager
- At Site 300, the Site 300 Manager
- Materials Management Section (if appropriate)
- LLNL Institutional Review Board (if appropriate)
- Plant Engineering Maintenance and Operations Division (PEMOD) Leader

Approver

- Facility AD

E.2 OSP Review and Approval

Below are the review and approval levels for all LLNL OSPs.

Level A. The following are examples of activities that require Level A review and approval:

1. An experiment involving nuclear fission in a self-sustaining chain reaction.
2. Use or storage of more than 45 percent of the minimum critical mass of a given form of fissile material.
3. Requests for a variance from mandatory codes, standards, and regulations (see Chapter 1 of the *Health & Safety Manual*) and the promulgation of its approval using an OSP; or requests for a change in a legal or DOE-prescribed safety analysis document (e.g., safety analysis report, TSR, and Environmental Impact Statement).
4. An activity that takes place offsite for which LLNL personnel have full or partial operating responsibility and an OSP is required.
5. An activity that may produce undesired effects (i.e., death or injury to a member of the general public, damage to non-DOE property, and/or damage to the environment).
6. Any experiment involving human subjects.

Reviewers

- Responsible Individual
- The supervisor of matrixed personnel involved in the activity
- Facility Supervisor or Manager
- ES&H Team Leader
- Materials Management Section (if appropriate)
- LLNL Institutional Review Board (if appropriate)

Concurrence

- Facility AD (or designated alternate), if the activity is conducted in a facility under the management of another AD, or the Facility Manager
- Safety representative at the offsite location where the operation is being conducted
- At Site 300, Site 300 Manager

Approver

Program AD (or designated alternate) for the program conducting the activity

Level B. The following are examples of activities that require Level B review and approval:

1. An activity that requires an OSP, but for which approval is not specified as Level A nor is the activity included in Level C.
2. An operation involving fissile or radioactive material.
3. An operation involving explosives.

Reviewers

- Responsible Individual
- The supervisor of the matrixed personnel involved in the activity
- ES&H Team Leader
- Materials Management Section (if appropriate)
- Peer-review committee (explosives operations at the Livermore site)

Concurrence

- Facility Supervisor or Manager
- At Site 300, Site 300 Manager

Approver

The Program Division Leader, Department Head, or Program Leader for the activity

Level C. The following are examples of activities that require Level C review and approval:

1. A change to an existing OSP that does not increase the residual risk level.
2. The first extension of the expiration date of an existing safety procedure that does not include any other changes.
3. An OSP for an activity that meets all the requirements of the *Health & Safety Manual* and *Environmental Compliance Manual,* but is required only because of a management directive.

Reviewers

- Responsible Individual
- The supervisor of the matrixed personnel involved in the activity
- ES&H Team Leader

Concurrence

- Facility Supervisor or Manager
- At Site 300, Site 300 Manager

Approver

The Program Division Leader, Department Head, or Program Leader for the activity

E.3 Special Reviews for Specified Hazards

Explosives. A peer-review committee shall review the draft procedure for explosives operations. Each Directorate may establish its own list of peer-review personnel or obtain assistance from the High Explosives Safety Committee. The area of explosives expertise for each topic (e.g., synthesis or initiation) shall be indicated next to name of each person on the list. Individuals on this committee must be qualified and knowledgeable of explosives operations. The committee shall document its comments

on a separate pre-publication form, and use a separate signature page marked "Peer Review" for the final safety procedure. This page shall be retained by the ES&H team with the original safety procedure.

Fluorine. Experiments involving fluorine that pose a greater risk of harm than that caused by a 250-ft^3 mixture of expanded volume quantities of 10% fluorine and inert gas must be reviewed by the Laboratory Pressure Safety Committee.

Human Subjects. Any experiment that involves the use of human beings or tissue from humans must be reviewed by the Laboratory's Institutional Review Board. Contact the Biology and Biotechnology Research Program Office for additional information.

Animals. Any experiment that involves the use of live animals must be reviewed by the Institutional Animal Care and Use Committee. Contact the Biology and Biotechnology Research Program Office for additional information.

Recombinant DNA. Any experiment that involves the use of recombinant DNA must be evaluated by the Institutional Biosafety Committee.

Offsite Jurisdiction. Activities that take place at an offsite location may be subject to additional reviews by jurisdictions having authority over the activity. For example, use of a high-powered laser to conduct astronomical or meteorological experiments may require the approval of the Federal Aviation Administration. These reviews should be obtained well in advance and documented in the safety procedure.

Appendix F

Lawrence Livermore National Laboratory
Operational Safety Procedure No. _____
Review level _____

Effective: _____
Expires: _____

Safety Procedure Review

In accordance with the requirements of Chapter 2 of the *Health & Safety Manual*, the Responsible Individual shall verify and document that personnel read and agree to comply with the safety procedure before beginning work on an activity controlled by a safety procedure.

All individuals listed below affirm that they have read and agreed to comply with the attached procedure.

Name	Signature	Date